

# Improving the Ability of Mathematic Problem Solving by Learning Management Based Internet Model in Students of Junior High School

<sup>1</sup>Marwati Abdul Malik, <sup>2</sup>Ma'sud B., <sup>3</sup>Arifin Ahmad, <sup>4</sup>Ranak Lince

Research Scholars

<sup>1,2</sup>Universitas Muhammadiyah Parepare, South Sulawesi, Indonesia

<sup>3</sup>Universitas Negeri Makassar, South Sulawesi, Indonesia

<sup>4</sup>Universitas Terbuka, Ambon, Indonesia

**Abstract** – Ability of mathematic problem solving as one of the extensive orientation of modern mathematic learning will provide students with other smaller skills that surround them. The skills are creative thinking skill, critical thinking skill, innovated skill and/or creative problem solving skill. In the globalization era as it is today, the use of learning technology is present as a media to facilitate students learning independently, especially if the learning time is limited, it has its own attraction. So the students can improve their own potential in solving mathematic problems. This paper was published from the results of action research aimed at improving the problem solving skill of Junior High School students by using Learning Management based internet model. Further, problem solving ability are targeted to be improved refers to Polya's theory (1981) : 1) ability to understand the problem; 2) ability to prepare problem solving model; 3) problem solving ability; 4) ability to re-examine the result of a mathematic problem. This study was tested at Junior High School 2 Parepare for two cycles, and six lessons, and two tests in the end of the cycle. The study results showed that there's increasing in problem solving capability based on these steps from first cycle to the second cycle as follows : 1) 68,4% to 90,6%; 2) 56,6% to 88,9%; 3) 49,8% to 84,4%; 4) 30,6% to 53,5%. In addition to the improvement of student's mathematic problem solving skill are also accompanied by increased presentation of student's learning activity by learning management model based on internet. Besides, 85% of students respond positively to the management learning model based on internet.

**Keywords** – problem solving, mathematic, ability, learning management, internet

## I. INTRODUCTION

One of the objectives of mathematics learning mentioned in the 2006 Education Unit Level Curriculum (KTSP) and Curriculum 2013 (K13) is to improve the ability to solve mathematical problems. The ability to solve such mathematical problems includes the ability to understand problems, design mathematical models, solve models and interpret the solutions obtained [1]. Based on the learning objectives then the first priority in learning by teachers today is, learning-oriented to the development of high-thinking skills and problem solving and utilization of computer media and ICT. This is in accordance with The Partnership for 21st Century Skills, are the skills students need to succeed in work, school and life, they include; 1) critical thinking and problem solving skills, 2) communications skills, 3) creativity and innovation skills, 4) collaboration skills, 5) contextual learning skills and information and media literacy skills, 5) information and communications technology literacy, 6) Life skills: leadership, ethics, accountability, adaptability, personal productivity, 7) personal responsibility, people skills, self-direction and social responsibility [2]. Therefore, mathematical problem solving is a strategic competence that must be demonstrated by learners.

The learning objectives as mentioned above, have not been reached at this time. Because based on the results of TIMSS in 2011, and PISA in 2012, the ability of Indonesian children in the field of mathematics is very low [3]. The low mathematical abilities according to PISA 2012 and TIMSS 2011 results, indicating a low level of mathematical problem solving skills in Junior High School. The aspects assessed in TIMSS are the application of knowledge and understanding of mathematical concepts. Aspects assessed in PISA are capabilities; Problem solving, reasoning, and communication [4]. The low ability of problem solving learners based on the results of analysis from several mathematics education experts and Marwati research findings caused by; (1) inadequate process components both by teachers as educators, as well as by learners, as beneficiaries of the outcomes of education itself, (2) lack of reasoning ability and understanding of mathematical concepts of learners, (3) learning by monotonous teachers, (4) teacher-centered learning (71% of teachers using direct learning models); (5) lack of reading references/readable materials to master concepts, and (6) lack of quality time and space to develop reasoning and analytical skills Students, and (7) lack of teacher motivation and motivation to develop students' reasoning and thinking power [5].

The above description shows that learning process that is not in accordance with the standard of learning process that contains the principles, among others, developing learning culture (reading and writing), encourage the active participation of learners, namely learning that is designed to focus on students to encourage motivation, interest, creativity, initiative, inspiration, independence, and spirit of learning, and applying information and communication technology [6]. The standard of education process in Indonesia is in line with the learning organization (LO) system developed by Marquart, namely; Learning, people, organization, knowledge, and technology [7]. Such referrals suggest that utilizing ICT in learning activities. In addition to

learning technology the quality of education problems lies also in the management of learning [8]. Thus one alternative to improve the quality of learning in such a way that can improve the problem solving ability of learners, is the model and learning tools that can be supported by technology and managed with the management system [9].

Therefore to improve students' math problem solving skills then the purpose of this research is to improve the problem solving ability of junior high school students in Parepare City through the implementation of internet based management model (Lemansiset).

**II. RESEARCH METHOD**

The type of research used is a quasi experiment with one group design model pretest and posttest design. With O1 pretest, O2 Posttest and X are treated by the Lemansiset model.



The population of class VIII SMP Negeri 2 Parepare consists of 8 classes. The sample is selected by classroom random sampling technique consisting of 1 class. Technique of collecting data used test instrument (pretest and posttest), as well as rubric of assessment of problem solving ability based on phases proposed by Polya on two linear equations [10]. Data analysis techniques used descriptive statistic that is to find the average, percentage and distribution of percentage of students' ability in solving math problems given. Furthermore, to strengthen the change of pretest and posttest result is used Gain Analysis Normalized. Furthermore, for the purposes of interpretation of research results used t paired test analysis with decision-making criteria  $H_0$  accepted if significant value  $P \geq \alpha$  and  $H_0$  rejected if significant value  $P < \alpha$ , with  $\alpha = 0.05$ . With research hypothesis There is a significant improvement in students' math problem solving abilities after being taught with Lemansiset model.

**III. RESULTS AND DISCUSSION**

In this research, the test is done twice, the test given to the students before the experiment with Lemansiset model and after learning as much as 3 times meeting. Based on the analysis obtained the results are summarized in the following table.

Table 1. Results of Student Problem Solving Ability Test Before and After Treatment with Lemansiset Model

Aspect	Pretest			Posttest		
	Score	Average	Ability %	Score	Average	Ability %
1	320	8,20	63,37	424	10,87	90,55
2	265	6,79	56,62	416	10,66	88,88
3	233	5,97	49,78	395	10,12	84,40
4	143	3,6	30,55	344	8,82	53,50

Based on Table 1 shows the percentage of problem-solving abilities for each aspect of improvement. While the improvement can be seen in diagram 1 below:

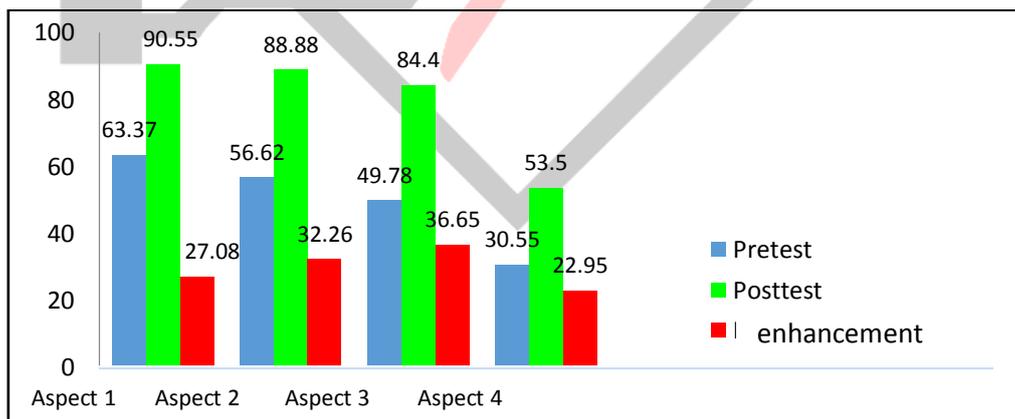


Figure 1 An overview of the percentage of problem-solving abilities on pretest and postes for each aspect.

Figure 1, shows that the third aspect of the highest increase. This is because basically the child can solve the problem well if he can find the model correctly. A correct model if students can analyze their understanding well about the concepts and algorithms associated with the problem. Then, a good model solution when the student is always accustomed to writing in accordance with his understanding of the test is to write what is known and what is being asked. The results of the test before the treatment in general students do not write what is asked. So the basic of analyzing to obtain problem solving model is less. Furthermore, in the fourth aspect the students also generally do not communicate the results in accordance with the demand of problems or problems, so that students' communication skills are not running well. Therefore at this stage students should always be trained to communicate the results so that reasoning abilities are also developed.

Furthermore, the results of the normalized Gain analysis of pretest and posttest results obtained results  $g = 0.675$ , this result means N-gain generated including high category. Furthermore, the results of t test analysis obtained are shown in the following table.

Table 3. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest	84.4615	39	7.38721	1.18290
	Pretest	51.6154	39	17.72244	2.83786

Table 4. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Posttest and Pretest	39	.679	.000

Table 5. Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Posttest Pretest	32.846 6	13.81559	2.21226	28.36766	37.32465	14.847	38 47	.000

Based on Table 5 shows that  $P = 0.000$  less than  $\alpha 0.05$  means Lemansinet Model can improve students problem solving abilities in SMP Negeri 2 Parepare.

Based on the result of data analysis, found that the ability of solving mathematics problems of junior high school students can be improved through internet based management model. This supports research conducted by Markus et.al, that model for teachers with the help of technology to improve students problem solving skills [11]. However it should also be noted that in this learning successfully involving students and students active and enthusiastic. Although in this study is the first time for students to use google application intensively. This strongly supports the existence of space and time quality for students can take advantage of outside school. So the problem in the learning process in the form of lack of time required for students to think and explore the results of his thinking, can be resolved. In addition, some facilities from Google APP can support learning done by students outside school hours with the use of internet technology.

Some research results that support ICT-based learning and management system are; The research results of Akman & Karaslan, Mahnegar, and Cavus & Alhih stated that web-based learning management system can improve the quality of learning, because it can improve communication between teachers and learners, and Communication among learners. This can happen because of the space for students to share results, can increase motivation, stimulation, attitude, interest, focus on solving problems/tasks, trust, comfort, perseverance, commitment, responsibility and attitude [7], [12], [13].

Patahuddin & Dole revealed that internet activities such as problem solving, mathematical search, can help learners achieve three goals, namely: (1) as an extraordinary tool for solving everyday problems; (2) facilitate children's learning; (3) confidence of children to have a good understanding and ability in the use of ICT [14]. The result of Suryadi (2007) study reveals that ICT-based constructive biology learning model is attractive and effective for improving learning motivation and cognitive ability of learners. Furthermore, cognitive abilities can improve the mathematical problem-solving skills of high school students [15].

#### IV. CONCLUSION

Based on the research results obtained that the ability to solve mathematical problems in students of SMP Negeri 2 Parepare can be improved through internet based management model. So the problem in the learning process in the form of lack of time required for students to think and explore the results of his thinking, can be resolved. In addition, some facilities from Google APP can support learning done by students outside school hours with the use of internet technology.

#### REFERENCES

- [1] G. Polya, "Mathematical discovery: On understanding, learning, and teaching problem solving," 1981.
- [2] B. Trilling and C. Fadel, *21st century skills: Learning for life in our times*. John Wiley & Sons, 2009.
- [3] M. O. Martin and I. V. S. Mullis, *TIMSS and PIRLS 2011: Relationships among Reading, Mathematics, and Science Achievement at the Fourth Grade--Implications for Early Learning*. ERIC, 2013.
- [4] B. Buhari, "Memahami Literasi matematis (A Lesson from PISA)." [Online] available: <http://bustangbuhari.wordpress.com/2011/11/22/memahamiliterasi-matematika-a-lesson-from-pisa/> [22 Desember 2012], 2012.
- [5] Marwati, 2017. Pengembangan Model learning Management berbasis Internet Untuk Meningkatkan kemampuan penyelesaian Masalah matematika Siswa di SMP. Disertasi. Universitas Negeri Makassar. Unpublished.
- [6] D. P. Nasional, "Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 22 Tahun 2006 tentang Standar Isi

- untuk Satuan Pendidikan Dasar dan Menengah,” *Lampiran Standar Keterampilan dan Keterampilan Dasar Mata Pelajaran Mat. untuk Sekol. Dasar (SD)/Madrasah Ibtidaiyah (MI)*. Jakarta Dep. Pendidik. Nas., 2006.
- [7] M. J. Marquardt, *Building the learning organization: mastering the five elements for corporate learning*. Hachette UK, 2011.
- [8] F. Mahnegar, “Learning management system,” *Int. J. Bus. Soc. Sci.*, vol. 3, no. 12, 2012.
- [9] D. S. Ibrahim and S. P. Suardiman, “pengaruh penggunaan e-learning terhadap motivasi dan prestasi belajar matematika siswa SD Negeri Tahunan Yogyakarta,” *J. Prima Edukasia*, vol. 2, no. 1, pp. 66–79, 2014.
- [10] G. Polya, *How to solve it: A new aspect of mathematical method*. Princeton university press, 2014.
- [11] M. Häikiöniemi, H. Leppäaho, and J. Francisco, “Model for teacher assisted technology enriched open problem solving,” in *Learning problem solving and learning through problem solving. Proceedings from the 13th ProMath conference*, 2011, pp. 30–43.
- [12] E. Akman, “Student perceptions on learning by design method in web-based learning environment: A case study,” in *A proceeding in IODL&ICEM 2010 Joint Conference and Media Days, Anadolu University*, 2010.
- [13] N. Cavus and M. S. Alhih, “Learning management systems use in science education,” *Procedia-Social Behav. Sci.*, vol. 143, pp. 517–520, 2014.
- [14] S. Pattahudin and S. Dole, “Using the Internet for mathematics teaching, learning and professional development in the primary school,” *Shap. Futur. Sci. Math. Technol.*, pp. 230–240, 2006.
- [15] Mas’ud. 2015. Kemampuan Pemecahan Masalah Matematika Peserta Dididk SMA di Kota Parepare tahun 2015. Preliminary Research Dissertation. Universitas Negeri Makassar. Unpublished.

